variation in effective tax rates across income levels and the change in that variation over time.[6] The observed variation in tax burdens under different measures of income is more pronounced for some income categories than others and for particular types of families.

Figure 1 shows the variation in the effective total federal tax rates faced by three income quintiles of all families in 1980, 1985, 1990, and 1995, and projected for 1999, under each of the six measures of income described above.[7] For all six measures, families in the lowest income quintile saw their federal tax rates rise between 1980 and 1985 before dropping in each successive five-year period. Observed effective tax rates vary across the six income measures, however, because of differences in the families comprising the lowest quintile. In 1980, for example, the effective tax rate ranged from 7.7 percent under the AFI measure to 9.5 percent with the per capita income measure. That pattern generally holds for other income quintiles of all families, although the variation in effective tax rates across measures is often smaller. For example, for families in the top quintile, the observed tax rate varies by less than one percentage point in every year. That smaller variation is likely the result of the population in the top quintile differing little across the six income measures. The lower income categories reveal greater variation in tax rates across measures, but nonetheless exhibit similar patterns of changing tax rates across the five-year intervals.

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6. Effective total federal tax rates are the sum of individual and corporate income taxes, payroll taxes, and excise taxes divided by family income. See Congressional Budget Office, *Estimates of Federal Tax Liabilities for Individuals and Families by Income Category and Family Type For 1995 and 1990*, May 1998, for a description of the methods used to measure total federal taxes at the household level.

7. Appendix Table A-3a shows the effective total federal tax rates for each income category of all families. Appendix tables A-3b through A-3d provide comparable information for families with children, elderly families, and other families, respectively.

Similar patterns obtain for families with children, elderly families, and other families, as shown in Figures 2 through 4 respectively. With few exceptions, the rise and fall of tax rates across the 1980-1999 period follow comparable patterns for each income measure. Again, the highest income quintile exhibits the least variation in effective tax rates across different measures, and the lowest income quintile shows the greatest variation. In general, it appears that the choice of income measure makes little difference in terms of the basic patterns of change in effective federal tax rates over time.

One difference is worth noting. For the lowest quintile of families with children, the effective tax rate in 1999 is projected to be about -2.5 percent under the cash measure, compared to -0.5 percent under the AFI measure and nearly 3 percent under the per capita measure. The negative rates result from the earned income tax credit (EITC), which will provide a refundable credit of up to $3,816 in 1999 for low-income families with two or more children and up to $2,312 for those with one child. The credits will phase out, however, for families with incomes above about $12,500, and families with incomes above about $30,000 will not qualify at all. Under the cash measure, families in the lowest quintile are those with the lowest cash incomes, and therefore those most likely to qualify for the EITC. Under the other measures, because they adjust for differences in family size, the lowest quintile contains many larger families with incomes high enough to disqualify them from receiving the EITC. It is thus the different composition of the lowest quintile under the six measures that generates the substantial variation in observed effective tax rates. The Congress has increased the size of the EITC over the past decade, so the effect has grown over time.

The Effects of Federal Taxes on the Distribution of Income

An alternative measure of the inequality of the distribution of income among families and individuals is the gini coefficient. The gini coefficient ranges from zero, when every unit has the same income, to one, when all income goes to one unit. The top two panels of Figure 5 show estimated gini coefficients for pretax and posttax family incomes, respectively, under each of the six income measures for 1980, 1985, 1990, 1995, and 1999.[8] The figure reveals four points. First, gini coefficients differ substantially across the six measures, with cash incomes showing the least inequality and the adjusted measures revealing progressively more inequality as we move across measures that take greater account of family size. Thus, the per capita measure shows the greatest inequality, the weighted per capita less, and per adult still less. The AFI and WAFI measures, which account for family members in a nonlinear manner, fall in the middle of that range.

Second, under all six measures, inequality has increased over the 19-year period, for both pretax and post-tax income, but the amount of change differs across the measures. For example, the gini coefficient for pretax income increased by 25 percent between 1980 and 1999 under the cash measure but only by 16 percent for per capita income. Changes in the composition of families over the period affect the changes in inequality measured under the different equivalence scales.

Third, federal taxes reduce income inequality, again regardless of how we measure income.

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8. Appendix Table A-4 shows the values used to create Figure 5.

In every year and under every measure, the gini coefficient for posttax income is between 4 percent and 12 percent lower than that for pretax income. The equalizing effect is not the same for all income measures, however. In percentage terms, the effect of federal taxes on the gini coefficient is greatest under the WAFI and per adult measures and least under the per capita measure. That observation demonstrates the differential taxes paid by different kinds of families. For example, the elderly, who are generally in smaller families, face lower average tax rates than younger families, so income measures that take greater account of family size and thus place smaller, elderly families higher in the income distribution, will show a smaller effect of taxes in reducing inequality. Conversely, because the EITC goes principally to families with children in the lower income categories, the income-equalizing impact of the EITC appears to be greater under measures that do not classify larger families with higher income lower in the distribution by adjusting for family size.

Finally, changes over time in the observed effect of federal taxes in equalizing posttax incomes differs little across the six equivalence scales. Under all six measures, the leveling effect of federal taxes fell between 1980 and 1985 and then rose in subsequent years. Federal taxes in the 1980-1985 period were characterized by generally rising tax rates as inflation pushed taxpayers into higher tax brackets and as payroll tax were increased to finance Social Security and Medicare. Both of those factors tended to raise taxes more for units lower in the income distribution than for those at the top, thus lessening the power of federal taxes to equalize incomes. Tax acts in 1986, 1990, and 1993 first leveled tax rates and then raised rates for high-income taxpayers. In combination with significant expansions of the EITC, the rate changes increased the income-equalizing effect of federal taxes.

Conclusions

Distributional analyses of federal taxes depend crucially on how families and individuals are ranked in the income distribution. Because family composition and other factors influence the level of well-being a family can attain with a given dollar income, meaningful distributional analyses must make adjustments to cash incomes to account for differences between families. The five adjustments examined in this paper result in significant reranking of families and individuals, and thus potentially could lead to differing conclusions about the distribution of federal taxes. At least for the six measures of income examined here and for changes in federal taxes that have occurred over the last two decades, choice of income measure matters little for distributional analyses. Conclusions about the distributional effects of federal taxes, based on both effective tax rates and gini coefficients, change little under the various income adjustments.

Table 1. Alternative Equivalence Scales

Family Composition	Family Cash Income (e=0, c=1)	Per Adult Income (e=1, c=0)	Weighted Per Capita Income (e=1, c=0.5)	Per Capita Income (e=1, c=1)	Weighted Adjusted Family Income (e=0.5, c=0.5)	Adjusted Family Income (e=0.5, c=1)	Implicit in Poverty Thresholds
One adult, no children	1.00	1.00	1.00	1.00	1.00	1.00	1.00
One adult, one child	1.00	1.00	1.50	2.00	1.22	1.41	1.32
Two adults, no children	1.00	2.00	2.00	2.00	1.41	1.41	1.29
One adult, two children	1.00	1.00	2.00	3.00	1.41	1.73	1.55
Two adults, one child	1.00	2.00	2.50	3.00	1.58	1.73	1.55
Three adults	1.00	3.00	3.00	3.00	1.73	1.73	1.50
One adult, three children	1.00	1.00	2.50	4.00	1.58	2.00	1.96
Two adults, two children	1.00	2.00	3.00	4.00	1.73	2.00	1.95
Three adults, one child	1.00	3.00	3.50	4.00	1.87	2.00	2.01
Four adults, no children	1.00	4.00	4.00	4.00	2.00	2.00	1.98
One adult, four children	1.00	1.00	3.00	5.00	1.73	2.24	2.26
Two adults, three children	1.00	2.00	3.50	5.00	1.87	2.24	2.29
Three adults, two children	1.00	3.00	4.00	5.00	2.00	2.24	2.35
Four adults, one child	1.00	4.00	4.50	5.00	2.12	2.24	2.43
Five adults, no children	1.00	5.00	5.00	5.00	2.24	2.24	2.39

* The equivalence scale implicit in the federal poverty thresholds equals the ratio of the poverty threshold for a given family composition divided by that for a single adult under age 65. That equivalence scale is shown here for comparison purposes only and is not included in the analysis. The poverty thresholds used are those for 1997.

Table 2. Percentage Distribution of Families and Individuals by Income Quintile, Equivalence Scale, and Type of Family, 1995

Income Percentile	Cash	Weighted WAFI	Weighted AFI	PAI	WPCI	Weighted PCI
			All Families			
Lowest	26.5	22.5	21.6	21.6	18.3	16.5
Second	22.6	20.4	20.0	19.5	18.8	18.1
Middle	19.1	19.5	19.4	19.1	18.5	18.5
Fourth	16.3	18.6	19.1	19.3	20.2	21.1
Highest	15.5	19.0	19.9	20.7	24.1	25.8
ALL	100.0	100.0	100.0	100.0	100.0	100.0
			Families with Children			
Lowest	20.0	22.2	23.5	19.3	24.0	26.8
Second	18.8	20.5	21.5	19.2	21.7	23.5
Middle	20.1	20.1	20.5	19.6	21.3	22.3
Fourth	21.2	19.6	19.0	21.0	18.7	17.2
Highest	19.8	17.6	15.5	20.8	14.2	10.2
ALL	100.0	100.0	100.0	100.0	100.0	100.0
			Elderly Families and Individuals			
Lowest	33.7	26.2	22.8	26.4	15.2	8.5
Second	28.6	26.2	25.5	26.0	25.2	23.5
Middle	17.1	19.5	20.5	19.2	20.5	21.5
Fourth	10.5	13.7	15.4	14.1	18.5	22.1
Highest	10.0	14.4	15.8	14.3	20.6	24.3
ALL	100.0	100.0	100.0	100.0	100.0	100.0
			Other Families and Individuals			
Lowest	28.1	21.2	19.6	21.1	15.5	12.3
Second	22.7	17.8	16.6	16.8	14.0	11.8
Middle	19.3	19.0	18.0	18.6	15.6	14.4
Fourth	15.2	19.9	20.9	20.2	22.0	23.5
Highest	14.7	22.1	24.9	23.3	32.9	38.0
ALL	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: Congressional Budget Office.

Table 3a. Quintile Movement of All Families, Cash versus Alternative Equivalence Scales, 1995 (In percent of all families)

Income Quintile Under Cash	Income Quintile Under Alternative Equivalence Scale					
	Lowest	Second	Middle	Fourth	Highest	All
			Adjusted Family Income			
Lowest	20.2	6.3	0.0	0.0	0.0	26.5
Second	1.5	11.2	8.4	1.5	0.0	22.5
Middle	0.0	2.4	8.3	7.1	1.2	19.2
Fourth	0.0	0.0	2.6	8.7	4.9	16.3
Highest	0.0	0.0	0.0	1.8	13.7	15.5
All	21.5	20.0	19.3	19.2	19.9	100.0
			Weighted Adjusted Family Income			
Lowest	21.4	5.1	0.0	0.0	0.0	26.5
Second	1.1	13.3	7.9	0.4	0.0	22.5
Middle	0.0	2.0	9.5	7.0	0.6	19.2
Fourth	0.0	0.0	2.1	9.8	4.4	16.3
Highest	0.0	0.0	0.0	1.6	14.0	15.5
All	22.5	20.3	19.4	18.6	19.1	100.0
			Per Capita Income			
Lowest	13.6	7.9	5.0	0.0	0.0	26.5
Second	2.6	5.9	4.4	7.3	2.5	22.5
Middle	0.3	3.6	4.5	5.3	5.4	19.2
Fourth	0.0	0.8	3.9	4.9	6.5	16.3
Highest	0.0	0.0	0.6	3.5	11.4	15.5
All	16.4	18.1	18.5	21.1	25.8	100.0
			Per Adult Income			
Lowest	18.5	7.9	0.0	0.0	0.0	26.5
Second	2.7	7.9	7.1	4.9	0.0	22.5
Middle	0.2	2.9	9.3	2.7	4.0	19.2
Fourth	0.0	0.6	2.3	9.6	3.8	16.3
Highest	0.0	0.0	0.5	2.1	12.8	15.5
All	21.5	19.4	19.1	19.2	20.6	100.0
			Weighted Per Capita Income (Per Adult + 0.5 Children)			
Lowest	15.9	7.9	2.7	0.0	0.0	26.5
Second	2.2	7.2	5.5	6.8	0.9	22.5
Middle	0.2	3.3	6.4	3.8	5.5	19.2
Fourth	0.0	0.5	3.6	6.7	5.5	16.3
Highest	0.0	0.0	0.4	2.9	12.2	15.5
All	18.3	18.9	18.5	20.2	24.1	100.0

SOURCE: Congressional Budget Office.

Table 3b. Quintile Movement of Families with Children, Cash versus Alternative Equivalence Scales, 1995 (In percent of all families)

Income Quintile Under Cash	Income Quintile Under Alternative Equivalence Scale					
	Lowest	Second	Middle	Fourth	Highest	All
			Adjusted Family Income			
Lowest	6.6	0.2	0.0	0.0	0.0	6.8
Second	1.4	4.8	0.3	0.0	0.0	6.4
Middle	0.0	2.3	4.3	0.2	0.0	6.8
Fourth	0.0	0.0	2.4	4.6	0.2	7.1
Highest	0.0	0.0	0.0	1.6	5.1	6.7
All	8.0	7.3	7.0	6.4	5.2	33.9
			Weighted Adjusted Family Income			
Lowest	6.5	0.3	0.0	0.0	0.0	6.8
Second	1.0	5.0	0.5	0.0	0.0	6.4
Middle	0.0	1.6	4.8	0.5	0.0	6.8
Fourth	0.0	0.0	1.6	5.2	0.3	7.1
Highest	0.0	0.0	0.0	1.1	5.7	6.7
All	7.5	7.0	6.9	6.7	6.0	33.9
			Per Capita Income			
Lowest	6.4	0.5	0.0	0.0	0.0	6.8
Second	2.5	3.4	0.5	0.0	0.0	6.4
Middle	0.3	3.4	2.7	0.5	0.0	6.8
Fourth	0.0	0.8	3.7	2.6	0.2	7.1
Highest	0.0	0.0	0.5	2.8	3.3	6.7
All	9.1	8.0	7.5	5.9	3.5	33.9
			Per Adult Income			
Lowest	5.2	1.6	0.0	0.0	0.0	6.8
Second	1.2	3.3	1.2	0.7	0.0	6.4
Middle	0.1	1.4	4.2	0.5	0.6	6.8
Fourth	0.0	0.4	1.0	4.9	0.8	7.1
Highest	0.0	0.0	0.3	0.9	5.6	6.7
All	6.6	6.5	6.7	7.1	7.1	33.9
			Weighted Per Capita Income (Per Adult + 0.5 Children)			
Lowest	6.1	0.7	0.0	0.0	0.0	6.8
Second	1.9	3.6	0.8	0.1	0.0	6.4
Middle	0.1	2.7	3.3	0.6	0.1	6.8
Fourth	0.0	0.5	2.8	3.6	0.4	7.1
Highest	0.0	0.0	0.3	2.0	4.4	6.7
All	8.2	7.3	7.2	6.3	4.9	33.9

SOURCE: Congressional Budget Office.

Table 3c. Quintile Movement of Elderly Families, Cash versus Alternative Equivalence Scales, 1995 (In percent of all families)

Income Quintile Under Cash	Income Quintile Under Alternative Equivalence Scale					
	Lowest	Second	Middle	Fourth	Highest	All
			Adjusted Family Income			
Lowest	4.5	2.2	0.0	0.0	0.0	6.7
Second	0.0	2.8	2.5	0.4	0.0	5.7
Middle	0.0	0.0	1.6	1.6	0.2	3.4
Fourth	0.0	0.0	0.0	1.1	1.0	2.1
Highest	0.0	0.0	0.0	0.0	2.0	2.0
All	4.6	5.0	4.1	3.1	3.1	20.0
			Weighted Adjusted Family Income			
Lowest	5.2	1.6	0.0	0.0	0.0	6.7
Second	0.1	3.6	2.0	0.1	0.0	5.7
Middle	0.0	0.1	1.8	1.4	0.1	3.4
Fourth	0.0	0.0	0.1	1.2	0.8	2.1
Highest	0.0	0.0	0.0	0.0	1.9	2.0
All	5.2	5.2	3.9	2.7	2.8	20.0
			Per Capita Income			
Lowest	1.6	3.5	1.6	0.0	0.0	6.7
Second	0.0	1.2	1.9	1.9	0.5	5.7
Middle	0.0	0.1	0.6	1.8	0.9	3.4
Fourth	0.0	0.0	0.1	0.6	1.5	2.1
Highest	0.0	0.0	0.0	0.1	1.9	2.0
All	1.6	4.7	4.3	4.4	4.9	20.0
			Per Adult Income			
Lowest	4.5	2.2	0.0	0.0	0.0	6.7
Second	0.7	2.4	1.6	1.0	0.0	5.7
Middle	0.0	0.5	1.9	0.4	0.5	3.4
Fourth	0.0	0.0	0.3	1.3	0.5	2.1
Highest	0.0	0.0	0.0	0.2	1.8	2.0
All	5.2	5.2	3.8	2.8	2.8	20.0
			Weighted Per Capita Income (Per Adult + 0.5 Children)			
Lowest	2.9	2.9	0.8	0.0	0.0	6.7
Second	0.1	1.9	1.8	1.6	0.3	5.7
Middle	0.0	0.2	1.3	1.1	0.9	3.4
Fourth	0.0	0.0	0.2	0.8	1.1	2.1
Highest	0.0	0.0	0.0	0.1	1.9	2.0
All	3.0	5.0	4.1	3.7	4.1	20.0

SOURCE: Congressional Budget Office.